Hidden Links: Irrigation, Malaria, and Gender

Women transplanting rice in Côte d'Ivoire. (Photo courtesy of Renaud De Plaen)

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In African countries, where the weather is extremely variable, irrigation is seen as one obvious way to increase agricultural production. But, irrigation affects more than the crops that grow in farmers' fields. In fact, researchers around the world are finding that irrigation can also affect people's health in sometimes unexpected ways. Malaria is a case in point.

By increasing wet areas, irrigation can increase breeding grounds for mosquitos — the main vectors (or carriers) of malaria. This, in turn, increases the likelihood that people living nearby will contract the disease. Moreover, a recent study by Renaud De Plaen, a researcher with Canada's International Development Research Centre (IDRC), suggests that the impact of irrigation on health extends even further. When farmers start irrigating their fields, a whole range of social and economic changes take place. These particularly affect women — and can change the way they treat malaria cases in children.

Malaria is a debilitating disease that claims an estimated two million lives each year in Africa. Malaria hits children hardest: one in four childhood deaths on the continent is attributed to the disease.

An ecosystems approach to research

To uncover links between malaria and irrigation, De Plaen took an ecosystems approach to human health in his research. This approach is based on the understanding that there is a complex relationship between human health and the ecosystems in which people live.

"To understand the impact of irrigation on malaria," says De Plaen, " it is necessary to look at the ways irrigation changes environmental conditions and host-vector contact. But it is equally important to assess the impact of irrigation on farming systems as well as the social and cultural environment." According to De Plaen, these factors can influence how vulnerable farmers are to malaria. He adds that understanding these factors can help local communities better manage ecosystems to improve their health — and the health of the ecosystem.

In 1997, De Plaen was involved in a health project undertaken by the West Africa Rice Development Association (WARDA) in Northern Côte d'Ivoire, near Korhongo. IDRC provided support for part of WARDA's research. De Plaen was the lead researcher and coordinator of the social science team. In addition, he designed his PhD research to complement the work of the project. In 2001, De Plaen joined IDRC as a program officer.

Irrigation and women's income

De Plaen's research focused on four villages in northern Côte d'Ivoire that were a subset of WARDA's larger research sample. In all four villages, farmers grew crops in both lowland and highland fields: rice was the staple crop. Two villages grew just one crop of rice in the lowlands during the rainy season. In the other two villages, where irrigation was available, farmers succeeded in growing two crops of rice.

In the villages with irrigation, food production increased. But De Plaen's research revealed that this improvement was not a boon for women in the village. In fact, he says rather than increasing women's income and food security, irrigation reduced both.

The role of women's "personal fields"

Among Sénoufo people in the study area, men and women assume different roles and responsibilities within the household. Traditionally, men are responsible for ensuring the family has basics: food, clothing, shelter, schooling, and so on. Women, on the other hand, take care of children, cook the meals, and usually provide the first treatment in case of illness using traditional remedies.

In the villages without irrigation, most food comes from upland family fields. Men manage these fields, where the whole family grows rice, maize, sorghum, peanuts, and cotton. Crops harvested from the upland fields are stored in family granaries. Men manage these granaries and sell part of the harvest to raise money to buy clothing, pay for health expenses, maintain the house, acquire farm equipment, and so on. Most of the household's food comes from the family granaries.

Lowland fields, on the other hand, are customarily considered to be women's personal fields. Women grow rice during the rainy season, and vegetables during the dry season. They store their crops, which they use to make sauce and to provide food for special occasions, in their own separate granaries. It is only when the family granaries are empty that men ask women to contribute to the household's food from their personal granaries.

Women also sell their surplus crops to earn extra income. Moreover, during the dry season, they undertake other money-making projects — for example, they make and sell beer, charcoal, crafts, or a cooking spice known as *sumbala*.

New roles for men and women

In villages with irrigation, a shift in gender roles is taking place. Because rice production in the lowlands increased to two crops a year, men began devoting less time to growing food crops in the upland family fields. Food production for the family therefore moved from family fields to women's personal fields. A larger proportion of the food that is consumed by the household now comes from women's individual granaries rather than from family granaries. In fact, it is mainly when the women's granaries are empty that men contribute from family granaries.

In addition, women spend more time tending the second crop of rice. As a result, they have less time to grow vegetables or to produce other goods for sale — activities that are traditionally an important part of their earnings. "The increase in rice production," says De Plaen, "therefore results in reducing women's net income."

A decline in food security

Surprisingly, De Plaen found that women from villages with two harvest of rice complained more often about not having enough food to feed their families. In part, this is because the second crop of rice is used to compensate for the smaller quantity of food now grown in the rain-fed uplands. In addition, women in two-crop villages have to sell a larger part of their agricultural production to raise emergency cash.

"Therefore," says De Plaen, "it appears that the intensification of rice production in Northern Côte d'Ivoire, while considerably increasing women's workload did not improve their economic status or the nutritional status of their children." However, De Plaen says these women value having greater control over managing their families food supplies. It allows them to feed their families without having to beg a moody husband to dole out staples from the family granary he controls. Most women see this as a net improvement of their status within the household.

Changes in "health-seeking" behaviour

Comparing villages with irrigation to those without, study teams also found differences in "health-seeking" behaviour — and learned that these differences affected how quickly children are treated for malaria.

In all the villages, men are responsible for seeking health care for their family — and for paying the bill. However, when symptoms of malaria first appear in children, women usually react by first administering indigenous treatments.

Differences between the one-crop and two-crop villages arise when the first set of treatments is ineffective.

An important customary rule is that the person who starts a treatment is responsible for paying all the related bills. In villages without irrigation, women have more income at their disposal. So, if the first treatment for malaria fails, these women usually quickly buy anti-malarial pills from the local market to start a second course of treatment. If malaria still persists, they then ask the head of the household to take the child to the health centre.

In villages with irrigation, women have less money at their disposal. So, if the first treatment fails, these women generally don't buy anti-malaria pills. Instead, they ask their husband to take the child to a health centre. This means children are taken in charge by the head of the family sooner, and subsequently go to the health centre sooner. However, this referral takes place later than the second treatment option (anti-malarial pills) initiated by women in unirrigated villages. Early treatment for malaria is an important factor in reducing the severity of malaria episodes.

Drawing conclusions

De Plaen draws two main conclusions. One, very specific to northern Côte d'Ivoire, is that the involvement of women in anti-malarial treatment is a key factor in the frequency and severity of malaria episodes.

The wider lesson is that traditional approaches to studying environmental changes and their effects on disease do not cover all the bases — and that an ecosystems health approach is an important complement to classical epidemiology.

"This research, I believe, helps to show that the impact of agricultural techniques, such as irrigation, on the health of human populations cannot solely be apprehended through usual approaches," De Plaen says. Uncovering the problem's many facets is, he adds, "much harder to assess, but I think it's essential."

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